

Application No. 09/987,262
Reply to the Office Action of November 30, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-25. (Canceled)

Claim 26. (Previously Presented) A catalyst, comprising:
a catalyst support which comprises said composite oxide powder recited in Claim 32;
and
a noble metal loaded on said catalyst support.

Claim 27. (Previously Presented) A catalyst, comprising:
a catalyst support which comprises said composite oxide powder recited in Claim 32,
and a solid solution or composite oxide of zirconia and yttria; and
a noble metal loaded on said catalyst support.

Claim 28. (Previously Presented) The catalyst according to Claim 26, wherein said noble metal comprises at least Pt.

Claim 29. (Previously Presented) The catalyst according to Claim 27, wherein said noble metal comprises at least Pt.

Claim 30. (Previously Presented) The catalyst according to Claim 27, wherein the compositional ratio by weight of said solid solution or said composite oxide of zirconia and yttria to said composite oxide powder is 0 to 100 - 100 to 0 exclusive.

Claim 31. (Previously Presented) The catalyst according to Claim 27, wherein the molar ratio of said zirconia and said yttria is $1 \leq \text{Zr/Y} \leq 4.5$ in terms of metal elements.

Claim 32. (Previously Presented) A composite oxide powder, consisting essentially of:

a mixture of particles of an oxide of metal M_1 which is cerium and an oxide of a metal M_2 which is at least one element selected from the group consisting of aluminum, titanium and silicon and which does not dissolve in said oxide of metal M_1 , wherein the cerium oxide constitutes more than 50 % by wt of the composite oxide powder, and wherein said composite oxide powder when calcined at 600° C for 5 hours has a porosity such that pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.13 cc/g or more and when calcined at 800° C for 5 hours has a porosity such that the pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.10 cc/g or more.

Claim 33. (Previously Presented) The composite oxide powder according to Claim 32, wherein when microanalysis of one of said composite oxide particles not overlapped is conducted by means of energy dispersive X-ray spectrometry (EDS) using a field emission scanning transmission electron microscope (FE-STEM) with a beam of 5 nm diameter, said metal M_1 and said metal M_2 are detected at a composition in ± 20 % of charge composition at 90 % or more of respective analytical points.

Claim 34. (Previously Presented) The composite oxide powder according to Claim 32, wherein when microanalysis of one of said composite oxide particles not overlapped is conducted by means of energy dispersive X-ray spectrometry (EDS) using a field emission scanning transmission electron microscope (FE-STEM) with a beam of 0.5 nm diameter, said metal M_1 and said metal M_2 are detected at a composition in $\pm 20\%$ of charge composition at 90 % or more of respective analytical points.

Claim 35. (Previously Presented) The composite oxide powder according to Claim 32, wherein the mixture of particles of the composite oxide in which particles of said oxide of said metal M_2 are dispersed is such that particles of the mixture of a size of not more than 50 nm constitute 90 % or more of the total weight of said composite oxide powder.

Claim 36. (Previously Presented) The composite oxide powder according to Claim 32, wherein said metal M_2 is Al.

Claim 37. (Previously Presented) The composite oxide powder according to Claim 32, wherein said oxide of metal M_1 is present in an amount of 75 % or more of the total weight of said composite oxide powder.

Claim 38. (Canceled)

Claim 39. (Previously Presented) The composite oxide powder according to Claim 45, wherein said metal M_3 is at least one element selected from the group consisting of Zr, alkaline earth metals and rare earth metals.

Claim 40. (Previously Presented) The composite oxide powder according to Claim 32, wherein cerium oxide after calcination at 600° C for 5 hours has a crystallite diameter of 5 to 10 nm which is calculated from a half width of an X-ray diffraction peak of CeO₂ (220).

Claim 41. (Previously Presented) The composite oxide powder according to Claim 32, wherein cerium oxide after calcination at 800° C for 5 hours has a crystallite diameter of 10 to 20 nm, which is calculated from a half width of an X-ray diffraction peak of CeO₂ (220).

Claim 42. (Previously Presented) The composite oxide powder according to Claim 32, wherein cerium oxide after calcination at 1000° C for 5 hours has a crystallite diameter of 35 nm or more, which is calculated from a half width of an X-ray diffraction peak of CeO₂ (220).

Claim 43. (Canceled)

Claim 44. (Previously Presented) A composite oxide powder, consisting essentially of:

a mixture of particles of an oxide of metal M₁ which is cerium and an oxide of a metal M₂ which is at least one element selected from the group consisting of aluminum, titanium and silicon and which does not dissolve in said oxide of metal M₁, wherein the cerium oxide constitutes more than 60 % by wt of the composite oxide powder, and wherein said composite oxide powder, when calcined at 600° C for 5 hours, has a porosity such that pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.13 cc/g or more and when

calcined at 800° C for 5 hours has a porosity such that the pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.10 cc/g or more.

Claim 45. (Previously Presented) A composite oxide powder, consisting essentially of:

a mixture of particles of an oxide of metal M_1 which is cerium and an oxide of a metal M_2 which is at least one element selected from the group consisting of aluminum, titanium and silicon and which does not dissolve in said oxide of metal M_1 , and an oxide of a metal M_3 which dissolves in at least one member selected from the group consisting of said oxide of metal M_1 and said oxide of metal M_2 , wherein the cerium oxide constitutes more than 50 % by wt of the composite oxide powder, and wherein said composite oxide powder when calcined at 600° C for 5 hours has a porosity such that pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.13 cc/g or more and when calcined at 800° C for 5 hours has a porosity such that the pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.10 cc/g or more.

Claim 46. (Currently Amended) A composite oxide powder, consisting essentially of:

a mixture of particles of an oxide of metal M_1 which is cerium and an oxide of a metal M_2 which is at least one element selected from the group consisting of aluminum, titanium and silicon and which does not dissolve in said oxide of metal M_1 , wherein the cerium oxide constitutes more than 50 % by wt of the composite oxide powder, and wherein said composite oxide powder when calcined at 600° C for 5 hours has a porosity such that pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.13 cc/g or more and when calcined at 800° C for 5 hours has a porosity such that the pores in the size range of 3.5 to

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100 nm in diameter have a volume of 0.10 cc/g or more; said composite oxide powder ~~obtainable~~ having been prepared by the steps of:

preparing an aqueous solution or water-containing solution of a chemical compound of a said metal M_1 and a chemical compound of a said metal M_2 , an oxide of which does not dissolve in said oxide of metal M_1 ;

precipitating said oxide of said metal M_1 or a precursor of said oxide of metal M_1 and said oxide of said metal M_2 or a precursor of said oxide of said metal M_2 or a chemical compound of said oxides or said precursors from said solution;

aging said precipitate in a suspended state in which water or a water-containing solution is a dispersion medium or in a state in which there is abundant water in a closed system consisting of said precipitate, steam and water; and then
calcining said precipitate.

Claim 47. (Currently Amended) A composite oxide powder, consisting essentially of:

a mixture of particles of an oxide of metal M_1 which is cerium and an oxide of a metal M_2 which is at least one element selected from the group consisting of aluminum, titanium and silicon and which does not dissolve in said oxide of metal M_1 , wherein the cerium oxide constitutes more than 60 % by wt of the composite oxide powder, and wherein said composite oxide powder when calcined at 600° C for 5 hours has a porosity such that pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.13 cc/g or more and when calcined at 800° C for 5 hours has a porosity such that the pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.10 cc/g or more; said composite oxide powder ~~obtainable~~ having been prepared by the steps of:

preparing an aqueous solution or water-containing solution of a chemical compound of a said metal M_1 and a chemical compound of a said metal M_2 , an oxide of which does not dissolve in said oxide of metal M_1 ;

precipitating said oxide of said metal M_1 or a precursor of said oxide of metal M_1 and said oxide of said metal M_2 or a precursor of said oxide of said metal M_2 or a chemical compound of said oxides or said precursors from said solution;

aging said precipitate in a suspended state in which water or a water-containing solution is a dispersion medium or in a state in which there is abundant water in a closed system consisting of said precipitate, steam and water; and then

calcining said precipitate.

Claim 48. (Currently Amended) A composite oxide powder, consisting essentially of:

a mixture of particles of an oxide of metal M_1 which is cerium and an oxide of a metal M_2 which is at least one element selected from the group consisting of aluminum, titanium and silicon and which does not dissolve in said oxide of metal M_1 , and an oxide of a metal M_3 which dissolves in at least one member selected from the group consisting of said oxide of metal M_1 and said oxide of metal M_2 , wherein the cerium oxide constitutes more than 50 % by wt of the composite oxide powder, and wherein said composite oxide powder when calcined at 600° C for 5 hours has a porosity such that pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.13 cc/g or more and when calcined at 800° C for 5 hours has a porosity such that the pores in the size range of 3.5 to 100 nm in diameter have a volume of 0.10 cc/g or more; said composite oxide powder ~~obtainable~~ having been prepared by the steps of:

preparing an aqueous solution or water-containing solution of a chemical compound of a said metal M₁, ~~and~~ a chemical compound of a said metal M₂, an oxide of which does not dissolve in said oxide of metal M₁, and a chemical compound of said metal M₃, an oxide of which can dissolve in at least one of said oxide of metal M₁ and said oxide of metal M₂;

precipitating said oxide of said metal M₁ or a precursor of said oxide of metal M₁, ~~and~~ said oxide of said metal M₂ or a precursor of said oxide of said metal M₂, and said oxide of metal M₃ or a precursor of the oxide of metal M₃, or a chemical compound of said oxides or said precursors from said solution;

aging said precipitate in a suspended state in which water or a water-containing solution is a dispersion medium or in a state in which there is abundant water in a closed system consisting of said precipitate, steam and water; and then

calcining said precipitate.